



NATIONAL INSTITUTE OF TECHNOLOGY ROURKELA

[Registration Link](#)



ABOUT NIT, ROURKELA

National Institute of Technology Rourkela is an Institute of national importance created under the act of parliament. NIT Rourkela has been ranked at 271-280 and 15th position in QS Asia University and NIRF (Engineering) 2022, respectively. Times Higher Education has figured NIT Rourkela in the group of 601-800 in World University Ranking 2022. The institute provides quality education in a diverse and multicultural environment. The mission of the institute is to become an internationally acclaimed institution of higher learning that will serve as a source of knowledge and expertise for the society and be a preferred destination for undergraduate and post graduate studies. The institute is offering undergraduate, postgraduate and PhD programmes in 21 branches of Engineering. The institute research centres are engaged in consultancy and research activities of several government bodies such as DST, DAE, CSIR, DRDO, BARC, ISRO and private industries.



DEPARTMENT OF CHEMICAL ENGINEERING

The Department of Chemical Engineering at NIT Rourkela focuses on the technology and fundamentals of chemical, petroleum/petrochemical, electrochemical, pharmaceutical, food, fertilizer, and many other products as well as the chemical processes used to manufacture such products.

The academic and research activities in the department focus on broad areas, including environmental, electrochemical computational fluid dynamics, process control, reaction engineering, transfer operations, thermodynamics, biochemical engineering, nanotechnology, renewable energy, and so on.

5th FEBRUARY 2024 - 9th FEBRUARY 2024

WORKSHOP

on

ADVANCED MATERIALS:

Materials for catalytic reduction of pollutants and their application as supercapacitors for energy storage



OBJECTIVE OF THE COURSE

Alternative energy sources, as well as improved technologies and techniques to use natural gas and other derivatives of fossil fuels, must be investigated due to the rising demand for fossil fuels, their diminishing supplies, and the need to safeguard the environment. Since natural gas is the most affordable fossil fuel and has the highest H/C ratio compared to other fossil fuels, natural gas consumption is expected to rise year over year. However, because unburned CH₄ has a 27.9 times more significant potential to cause global warming than CO₂, it is a more potent greenhouse gas and has attracted the interest of numerous research organizations. CH₄ combustion in stoichiometric/excess air leads to CO, CO₂, unconverted CH₄, and NO_x formation due to the presence of N₂ in the feed gas, which is also considered one of the greenhouse gases and has a hazardous environmental impact. Thus apart from unconverted CH₄, NO_x removal from the exhaust also becomes essential. Overall, this course will provide comprehensive details about the basic concept of synthesizing multifunctional catalysts through different routes and characterizing them. The synthesized materials would possess the activity to reduce CH₄ and NO_x. Similar multifunctional materials will then be used for electrode and device fabrication and will be used to show their application as supercapacitors.

COURSE CONTENT

1. Vehicular emission standards in India: History, challenges, and future aspects.
2. Industrial focus on harmful emission reduction from mobile/stationary sources.
3. Particular emphasis on nitric oxides (NO_x), methane (CH₄), and volatile organic compounds (VOCs) reduction from vehicular exhaust: catalytic systems in focus and their limitations .
4. Catalyst synthesis through various routes (ion exchange, co-precipitation, hydrothermal synthesis, and incipient wetness impregnation)
5. Characterization techniques including X-ray diffraction (XRD), specific surface area measurement (BET), Transmission electron microscopy (TEM), H₂/CO chemisorption, and Temperature programmed reduction (TPR).
6. Application of such materials in energy storage systems: supercapacitors.
7. Electrode fabrication through the slurry coating technique.
8. Device fabrication: Electrode and electrolyte assembling
9. Electrochemical characterization: Cyclic voltammetry, Galvanostatic charge/ discharge, Electrochemical impedance spectroscopy.
10. Future scope of such materials in energy storage systems.

Training session for the following equipment/analysis

Catalyst synthesis via different routes

- Ion-exchange
- Co-precipitation
- Hydrothermal synthesis
- Incipient wetness impregnation

Electrode fabrication:

- Slurry coating
- Conductivity measurement

Device fabrication

- Current collector
- Electrode and electrolyte assembling
- Open circuit voltage

TARGET AUDIENCE

Participants from industries and academia (including research scholars and faculty) actively involved in the chemical engineering sector would participate. Specifically, researchers (UG and PG) from government-recognized institutes (both central and state) will benefit most from this workshop. As per the scheme, only 25 participants will be selected.

OUTCOMES OF THE WEBINAR

The audience will have the chance to network with influential and accomplished individuals working in the field of chemical engineering. It will help scientists, academicians, and entrepreneurs to expand their networks. Young and enthusiastic scholars seeking knowledge and employment in chemical industries would learn about various opportunities in this sector and its future challenges. The participants will learn and teach in a collaborative, experiential, and outcome-based environment through live seminars, group discussions, and hands-on training.

Principal
Co-ordinator

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